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## Hypothyroxinemia in Acquired Immune Deficiency Syndrome (AIDS)

CC EZEALA\*, E CHUKWURAH\*\*

### SUMMARY

Serum thyroxine (T4) and thyroid stimulating hormone (TSH) were studied in 38 patients confirmed to be infected with HIV-1 virus and the results compared with values observed in age matched healthy subjects. The mean serum total T4 in the majority of the patients,  $103 \pm 32$  nmol/L, was similar to values observed in the

controls,  $102 \pm 21$  nmol/L,  $p > 0.05$ . However, 22.2 pc of the HIV-1 infected patients had total serum T4 values that were significantly lower than values in the controls,  $36 \pm 12$  nmol/L,  $p < 0.001$ .

Since hypothyroxinemia has been associated with increased mortality in critical illness, we suggest that assessment of thyroid function may be helpful in the management of some patients with AIDS.

### INTRODUCTION

Acquired immune deficiency syndrome (AIDS), a disease predictive of a defect in the cell-mediated immunity, is caused by the human immuno-deficiency virus (HIV).<sup>1-3</sup> Infection with this virus results in a gradual but progressive deterioration of immune function leading to disease manifestation. The syndrome is characterised by generalised infection and lymphadenopathy, and is often associated with multisystem disorders.

Patients with AIDS have been reported to have a high frequency of endocrine abnormalities, mostly affecting the adrenal gland, but also the thyroid and other endocrine organs.<sup>4-8</sup> These lesions may result from necrosis, infection of the organs, or malignant transformations, presenting as Kaposi sarcomas.<sup>4-6</sup>

Altered thyroid function in critical non thyroidal illness has become well recognised.<sup>9-11</sup> Thus, circulating levels of triiodothyronine (T3), thyroxine (T4), and thyroid stimulating hormone (TSH), can change remarkably, with values falling outside expected ranges in healthy subjects.

We examined circulating levels of total serum T4 and TSH in some Nigerian patients known to be infected with HIV-1 and compared these with values in normal subjects.

### MATERIALS AND METHODS

The patients, 38 in number, comprising 24 males and eight females with a mean age of  $28 \pm 10.3$  years ( $\pm$  SD) were admitted into the University of Nigeria Teaching Hospital for a variety of disease conditions including pulmonary tuberculosis, generalised infections, and chronic renal failure. They were all screened and confirmed to be seropositive for antibodies to HIV-1.

The control consisted of a group of age matched apparently healthy subjects drawn from blood donors at the University of Nigeria Teaching Hospital Blood

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Bank and hospital staff screened and found to be seronegative for antibodies to HIV-1 and 2 and HbS Ag.

Five millilitres of venous blood were collected from each subject and the sera separated and stored at -20°C until required for analysis.

Screening for antibodies to HIV-1 and 2 were done using Wellcozyme HIV 1+2 kits (Murex Diagnostics Ltd, Dart Ford, England). Confirmatory tests were by Western blot using NOVAPATH HIV-1 immunoblot (Bio Rad Laboratories Ltd, Hampstead, UK).

Total serum T4 was estimated by an 'in-house' radioimmunoassay using reagents obtained from NETRIA (St Bartholomew's Hospital, London, UK). Radioactive measurement was accomplished with a multiwell gamma counter (Oakfield Instruments Ltd, Oxon, USA) interfaced to an AMSTRAD PC 1640 Computer and Epson LX — 850 Printer. Interpolation and curve plotting were achieved with the aid of these instruments using a logit-bog data reduction model.

Serum TSH was estimated using an 'in-house' double antibody immunoradiometric assay with reagents obtained from NETRIA. Radioactivity measurement and interpolation were accomplished with the above instruments on a five parameter logistic model. All assays were done in duplicate and results presented as mean  $\pm$  standard deviation (SD).

## RESULTS

A mean T4 value of  $102 \pm 21$  nmol/L. was obtained in the controls with observed values varying between 57 and 163 nmol/L, while the mean serum TSH was  $3.2 \pm 1.2$  mU/L with observed values varying between 0.6 and 6.8 mU/L. Serum T4 values in 30 of the 38 AIDS patients were similar to the values in the controls,  $103 \pm 32$  nmol/L  $p > 0.05$ , with observed values varying between 56 and 150 nmol/L. Serum TSH in these patients were also similar to the controls having a mean value of  $3.6 \pm 1.9$  mU/L,  $p > 0.05$ . However, three patients had TSH values below the lower reference value. The T4 and TSH values in the controls and the 30 patients are shown in Table I.

Eight patients (i.e. 22.2 per cent) had total serum T4 values that were significantly less than values in the controls,  $36 \pm 12$  nmol/L,  $p < 0.001$ . However, serum TSH values were not significantly different from values in the controls,  $3.8 \pm 2.5$  mU/L,  $p > 0.005$ , except one patient who had a TSH value of 12.6 mU/L. The T4 and TSH values in the eight patients with hypothyroxinemia are shown in Table II.

*Table I: Serum T4 and TSH in controls and AIDS patients with normal thyroid function.*

	T4 (nmol/L)	TSH (mU/L)
Controls	$102 \pm 21$ (57 – 163) n = 62	$3.2 \pm 1.2$ (0.6 – 6.8) n = 35
AIDS patients	$103 \pm 32$ (56 – 150) n = 30	$3.6 \pm 1.9$ (< 0.6 – 7.1) n = 30

**Results are presented as mean  $\pm$  SD.  
Values in brackets represent the range.**

*Table II: Serum T4 and TSH in the eight patients with hypothyroxinemia.*

S/no	T4 (nmol/L)	TSH (mU/L)
1	40	2.8
2	25	12.6*
3	25	4.4
4	50	1.0
5	50	7.4
6	45	7.1
7	16	3.2
8	40	1.0
Range	16 – 50	1.0 – 12.6
Mean	$36 \pm 12$	$3.8 \pm 2.5$

**\*This value is an outlier; it is not included in the calculation of mean value.**

## DISCUSSION

Our study reveals that the majority of patients infected with HIV-1 had normal thyroid function. However, a significant number had hypothyroxinemia. There are many possible causes of hypothyroxinemia in critical illness. A decrease in serum thyroid hormone binding globulin (TBG) level<sup>12</sup> and inhibition of T4 binding to TBG due to the presence of an inhibitor sometimes found in the plasma of critically ill patients<sup>13</sup>, may be responsible for the low T4 values observed in some of these patients.

Measurement of the physiologically active free hormone in the form of free thyroxine index (FTI) or routine free T4 (FT4) assays by some workers<sup>14,15</sup> has revealed a high incidence of low values in intercurrent non thyroidal illness. The conclusion, therefore, has been that using these parameters as estimates of thyroid activity may be misleading in a high proportion of patients.<sup>16,17</sup> Nevertheless, hypothyroxinemia has been associated with high mortality and poor prognosis in critically ill patients.<sup>14,18</sup> We, therefore, suggest that thyroid assessment may be helpful in the management of some patients sick with AIDS and AIDS associated conditions.

The secretion of TSH has been reported to be inhibited in severe non thyroidal illness.<sup>19</sup> This may account for the low values found in some of our patients. Although pituitary insufficiency has been reported in AIDS,<sup>20</sup> Verges and others observed that this is likely to be infrequent.<sup>21</sup>

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